

most mountain and plateau States. In the eastern half the coldest weather came usually about the 4th or else early in the second decade. Most of the western half experienced its coldest weather about the 27th. At Havre, Mont., -4° , on March 26, was lower than any reading since November 15, last, save one day in January when the same mark was noted.

PRECIPITATION

The monthly amounts of precipitation are given in Table 1, p. 134.

During the first decade there was precipitation in moderate amounts over much of the eastern half of the country, the amounts being especially heavy in the region of the central valleys, and fairly heavy near Lake Michigan and the east Gulf and New England coasts.

The fortnight from the 10th to the 24th brought light to moderate amounts to numerous areas, especially the Pacific Northwest, the northern Plains and thence eastward as far as the western end of Lake Superior and much of Texas and the South and Middle Atlantic States.

The final week brought more precipitation to a large part of the country than any preceding week of March. Most districts received moderate to considerable amounts, save the Rio Grande Valley and areas westward to the south Pacific coast, a broad belt from Montana to Minnesota, and the upper Ohio Valley and the Carolinas.

As a whole, March brought considerably more moisture than any of the months just preceding, and the distribution was comparatively favorable. No State received twice the normal March quantity, on the average, and only in Arizona and California was less than half the normal received.

There usually was more than normal in Washington, Oregon, and Idaho, especially in the western part of the last named and near the lower Columbia River. Much of New Mexico and Texas, nearly all of the Plains, several parts of the Lake region, and most of the upper Mississippi Valley had somewhat more precipitation than normal. Southern Florida received much more rain than normal, and the rest of the east Gulf coast region a trifle more, while from Chesapeake Bay to Maine there was a moderate excess of precipitation.

There was a considerable deficiency from the central portions of Georgia, Alabama, and Mississippi northward to northern Ohio and Indiana; likewise in most of the middle and northern Rocky Mountain regions. The chief area of marked shortage embraced the middle and southern Plateau and Pacific regions, the scarcity of rain being notable in southwestern Arizona and far southern California.

A few stations in Oregon and Washington measured about 30 inches during March, but east of the Pacific States the greatest amount reported was 9.25 inches at a station in Florida. In Maryland, where the monthly precipitation averaged above normal for the first time since November, 1929, every station measured more than 3 inches, while in Kentucky and the Virginias, where once more the average was less than normal, the distribution was yet so favorable that the least amount reported was 1.54 inches.

SNOWFALL

The month's snowfall (see Table 1 and Chart VII) was more than normal over most central and north-central portions, and was usually greater than for any preceding month of the winter. From Kansas to the middle Ohio Valley the quantities were generally more than twice the normal, and in the Lake region, New England, and the western half of the Middle Atlantic States somewhat greater than normal.

The eastern half of the Middle Atlantic States had less than normal and the same was true of Tennessee. Minnesota likewise received somewhat less than normal.

In the far West there was comparatively little snowfall, and the elevated portions of central and southern California received particularly little. Parts of Idaho, however, and much of the Rocky Mountain region received moderately heavy falls, with somewhat improved outlook resulting as to the water supply of the coming season.

The most important falls of snow occurred from eastern Kansas to western New York about the 5th to the 11th, and over most of the Rocky Mountain and Plains regions and part of the Great Basin during the final week. This latter storm gave notable large amounts in the western portion of the central and southern Plains, where the snowfall was accompanied by intense winds and very low temperatures.

SUNSHINE AND RELATIVE HUMIDITY

Much cloudy weather prevailed from the eastern Great Plains eastward, except in the South. It was unusually cloudy in the upper Ohio Valley, the lower Lake and central Appalachian regions. Parkersburg, W. Va., reports the cloudiest month of record. In the Gulf States 50 per cent or more sunshine prevailed, while in the far Southwest from 70 to 80 per cent or more was received. In the central and northern Great Plains, and eastward to the Atlantic the relative humidity was generally above normal, except in Iowa and portions of adjacent States; while elsewhere it was generally below the average. The departures as a rule were not large, except in a few localities in the far West.

SEVERE LOCAL STORMS, MARCH, 1931

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Ventnor and Atlantic City, N. J.	4					Gale and high tide.	Part of pier swept away; boardwalk damaged.	Washington Post (D. C.).
Long Island, N. Y.	4					do.	Seaside cottages damaged; greatest havoc at East Hampton.	Washington News (D. C.).
New England coast.	4				\$2,000,000	Wind and storm tides.	Several towns partly inundated; cottages wrecked; merchandise soaked; roads washed out; traffic stalled. Severest damage between Boston and Salem, Mass.	Evening Star (Washington, D. C.).
North-central States (parts of).	5-9					Snow, wind, glaze.	Wires, poles, and trees damaged; highways obstructed; trains off schedule.	Official, U. S. Weather Bureau
Bossier City, La.	6	8 p. m.	66-440		5,000	Tornado.	5 buildings practically demolished; telephone poles blown down; path 3 miles long.	Do.
Memphis, Tenn.	7					High wind.	Steamer George Woods sunk.	Do.
Asbury Park to Sandy Hook, N. J.	8				75,000	Wind and high tides.	Chief damage by water, character not reported.	Do.

Severe local storms, March, 1931—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Knoxville, Tenn. (near).....	8					Snow.....	Minor property damage.....	Official, U. S. Weather Bureau.
Memphis, Tenn.....	8					High winds.....	Two boats blown from dock and sunk.....	Do.
Maryland (central part).....	8					do.....	Some buildings damaged, especially in Washington County.	Do.
Northport section of Long Island, N. Y.....	8				50,000	do.....	Summer homes and bathhouses damaged.....	Do.
Westchester County, N. Y.....	8					do.....	Thousands of dollars damage to houses, trees, signs, windows, and telephone and power lines.	Do.
Massachusetts, New Hampshire and Vermont.....	8-9					Snow and wind.....	Transportation crippled over large area.....	Do.
Eastern Shore, Virginia and Maryland.....	16-17				\$1,000,000	Heavy snow and high winds.....	Damage chiefly to overhead wires.....	Do.
Desdemona, Tex.....	19	7.45 p. m.	1,760			Wind and hail.....	Damage chiefly to oil derricks; gardens injured.	Do.
Clinton, Okla.....	19	p. m.		2	60,000	Tornado.....	Store and school annex demolished; 12 homes unroofed; a score of persons injured; path 3 blocks wide.	Washington News (D. C.).
Pensacola, Fla.....	21	a. m.				High wind.....	2 boats beached; sign boards blown down; windows broken.	Official, U. S. Weather Bureau
Colorado, Iowa, Kansas, Missouri, Nebraska, Oklahoma, Wisconsin, and Wyoming, parts of.	25-28			25		Blizzard.....	Highways and country roads impassable; thousands of cattle killed; great loss of sheep and hogs; trains delayed; 5 children died in school bus stalled near Towner, Colo., on the 27th; scattered deaths elsewhere.	Do.
Kerr, Kendall, and Blanco Counties, Tex.....	27	12.15 a. m.—1 a. m.	15 mi.		10,000	Hail.....	Considerable damage to crops, gardens, and buildings; some loss of livestock.	Do.
Jacksonville, Fla.....	28					Wind squall.....	Considerable damage to trees and hanging signs; small pleasure yacht damaged dock and boat slips.	Do.
Macedonia, Fla. (near).....	28	4-5 p. m.				Wind.....	Small buildings unroofed; trees uprooted....	Do.
Mulberry to Winter Haven, Fla.....	31	9.30 a. m.—10.30 a. m.	100		50,000	Tornado.....	A number of residences damaged, 1 completely demolished; considerable injury to groves; several persons injured; path 20 miles long.	Do.
Indian River City, Fla.....	31	11.30 p. m.			2,000	Wind.....	1 residence, several garages, and a water tank damaged.	Do.
Talbot, Meriwether, and Upson Counties, Ga.....	31				30,000	Series of severe hailstorms.	Damage almost entirely to peach trees; 4 persons injured.	Do.
Alabama (central and southern counties).....	31			1		Hailstorms and 2 tornadoes.	Considerable damage to farm buildings and other property in Coffee and Elmore Counties by tornadoes; damage by hail in Clinton County.	Do.

¹ Mi. signifies miles instead of yards.

RIVERS AND FLOODS

By MONTROSE W. HAYES

Floods in March were of minor consequence. The few rivers that overflowed were out of banks for a very short time and no high stages were reached.

During the week beginning March 22 the temperatures were in the fifties and snow melted rapidly over the upper part of the Susquehanna Basin, in New York. Rain late in the week further augmented the melting and the Chenango and Tioughnioga Rivers and smaller streams ran bankful. Some highways along the Tioughnioga were flooded, and a man was drowned, due to the overturning of a canoe by the swift current, at Blodgett's Mills, near Cortland, N. Y. There was no other flooding in the Atlantic Seaboard drainage.

The St. Francis River, in southeast Missouri and northeast Arkansas, and the Black River, in northeast Arkansas, were out of their banks in the second week of the month, but the overflow was slight and the damage was almost negligible.

The Sulphur River, a tributary of the Red, was in very moderate flood twice. The rises were rapid and there was a total loss of about \$12,000 in livestock, and about an equal saving made possible by the flood warnings.

In the Trinity River, in Texas, there were slight overflows during the first half of the month. The damage was confined to levees under construction.

Some of the rivers of Washington and Oregon were in flood on March 31. These floods will be considered in the April, 1931, MONTHLY WEATHER REVIEW.

The following reports from officials in charge of Weather Bureau offices are considered of interest:

Cairo, Ill.—Ohio River dams in this district were lowered on February 14, except No. 52, which remained up till February 17. The dams had been up since the last week in May, 1930. They were originally intended as an aid to navigation in the summer and autumn low-water periods, but the prolonged drought made necessary their operation through the winter.

New Orleans, La.—The Mississippi and Atchafalaya Rivers were unusually low for the season. Lower stages have been recorded, notably in the first half of March, 1895, but the absence of any material rise in March, 1931, gave an average stage of 3.1 feet on the Carrollton (New Orleans) gage, which is lower than any previous average stage for the month.

Table of flood stages in March, 1931

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC DRAINAGE					
Chenango: Sherburne, N. Y.....	<i>Feet</i> 8	29	29	<i>Feet</i> 8.1	29
MISSISSIPPI DRAINAGE					
St. Francis:					
Chaonia, Mo.....	22	8	9	23.8	9
Fisk, Mo.....	20	9	12	23.2	10
St. Francis, Ark.....	18	13	17	19.4	15
Black: Black Rock, Ark.....	14	8	12	17.5	9
Sulphur: Ringo Crossing, Tex.....	20	{ 3 28	5 28	24.0 22.0	3 28
WEST GULF DRAINAGE					
Trinity:					
Dallas, Tex.....	28	{ 1 8	5 9	31.8 28.7	3 8
Trinidad, Tex.....	28	6	10	29.5	8-9
PACIFIC DRAINAGE					
North Santiam: Mehama, Oreg.....	15	31	(1)	15.5	-----
Santiam: Jefferson, Oreg.....	10	31	(1)	15.5	-----
Willamette: Harrisburg, Oreg.....	10	31	(1)	10.6	-----

¹ Flood continued into April.